discredit a useful mode of therapy in this as well as in other forms of bacterial asthma.

Besides the proper selection of patients, two other factors are essential for a successful result. Manifest pathologic conditions of the nose, throat and paranasal sinuses, which may be responsible for continued reinfection of the respiratory tract should be corrected; and every consideration should be given to improving the general health and resistance of the patient.

CONCLUSIONS

Post-influenzal bronchitis with or without symptoms of bronchospasm is a frequent sequel of epidemic influenza.

We believe the condition to result from secondary infection of a congested and edematous bronchial mucous membrane with a streptococcal flora containing, in the main, four types of these organisms.

Vaccination of such patients, over a shorter or longer period, with carefully prepared and properly administered autogenous vaccines containing these organisms gives results when all other methods of treatment have failed.

A successful therapeutic result would seem to depend not so much upon the age of the patient and the duration of symptoms as upon the absence of irreparable damage in the lungs and bronchi.

DISCUSSION

Max Rothschild (380 Post Street, San Francisco)—Asthma may be the resultant of so many different causes that it might be advisable to consider it an important and usually most distressing symptom instead of a disease per se. Therefore it is of the utmost importance to find out before beginning treatment of any kind, to what influence or to what kind of an infection an asthma is due. Very often the previous history will give us the necessary information.

If an asthmatic traces the beginning of the symptoms to an influenzal attack, it is most probable that this infection with a resulting bronchitis may be the cause for the attacks. We all have seen cases in which the asthmatic attacks do not last through the year, but occur at certain times when the weather condition may predispose susceptible individuals to bronchitis, and these cases are certainly not due to food or foreign protein-sensitiveness. These so-called attacks of winter asthma resemble, to a certain extent, the post-influenzal cases described so well in Dr. Hurwitz' paper. They are bacterial in nature, and we observe them frequently in children. These cases yield usually in a most gratifying way to vaccine treatments, and they do so without any changes being made in their mode of living or diet. The bronchial muscle-spasm is often due to some foreign protein or protein-derivative, as is generally known, but it is also unquestionably due at times to an inflammatory process in the mucous membrane with a resulting secretion of mucus and an obstruction of the bronchioli. And these are the cases of which Dr. Hurwitz speaks and which are so splendidly relieved by the proper use of properly prepared autogenous vaccines. It is always advisable to test these cases with the different bacterial proteins and we must not forget that we have to consider "second day" reactions in these patients. We believe that in the majority of these cases where large amounts of vaccines are used, the results seem to be better. I remember especially a case of a young boy with very severe asthmatic attacks—post-influenzal. The treatment by Dr. Hurwitz—to whom I referred the case—was certainly remarkable and bears out his ideas and conclusions. Another most instructive case has been observed by us which, while it was not due to an influenza, but to a tuberculosis, resembled in its asthma-causing attacks those post-influenzal cases. The inflammatory process in the mucous membrane of the bronchi or bronchioli with secretion of mucus and obstruction produced intense muscle-spasm. As climatic changes did not help her, we compressed the diseased lung, and immediately the asthmatic attacks stopped and have not recurred. It proves that these attacks are not always due to bacterial proteins, but often to mechanical obstruction in the bronchioli.

George Piness, M. D. (1136 West Sixth Street, Los Angeles)—The treatment of post-influenzal asthmatic bronchitis is not as simple as one would think after reading Dr. Hurwitz's paper. My experience with this type of bronchitis has been that it is the most stubborn type to contend with and that it does not respond to treatment very readily. The results are dependent upon two factors; first, the preparation of a suitable vaccine; secondly, time and patience, and then only about 37 per cent obtain the results desired.

The treatment described by Dr. Hurwitz is similar to that carried on in my own practice, with the exception that we carry on our treatment over a longer period of time, approximately six months.

I am fully in accord with the writer in that local reactions are not a factor in determining the end result, since a great many patients give reactions locally without obtaining results, while others have no local reactions and do obtain results.

We are at present treating a series of cases, such as those described by Dr. Hurwitz, with chlorine gas, but it is too early to report results at this time. We will, however, publish them in the near future, regardless of whether they are successful or otherwise.

SURGERY OF THE ANTRUM OF HIGHMORE*

By CULLEN F. WELTY, M. D., San Francisco

For diagnosis as well as for purposes of treatment, a probe puncture of the Antrum of Highmore will give definite information.

The x-ray is of little or no benefit in determining the kind of operative procedure necessary.

We rarely see a nose that is perfect anatomically with an acute infection.

Because of the multiplicity of the different operative procedures on the Antrum of Highmore, it is at once apparent that they have not been satisfactory in the ultimate outcome.

For this reason I am going to submit to you the definite operations that I have used and explain to you why I believe they are superior to any others.

We will divide the surgery of the Antrum of Highmore into operations for acute infections and operations for chronic infections. As to the time when an acute infection becomes chronic, it is difficult to establish the acuteness or the chronicity of an individual case. From a surgical standpoint it depends entirely on the pathological conditions present. From this you can readily understand that the question resolves itself largely to the judgment of the individual surgeon.

However, there are certain definite lesions that are present at times in chronic cases that establish beyond a question of doubt the operative procedure to be adopted. Again, there are chronic cases that do not show any definite pathology. There are some few acute cases that show by minor surgical procedures that the changes in the mucous membrane have been of such a nature that they will not recover,

* Presented to the Section on Eye, Ear, Nose, and Throat, Fifty-third Annual Session of the California Medical Association, Los Angeles, May, 1924.

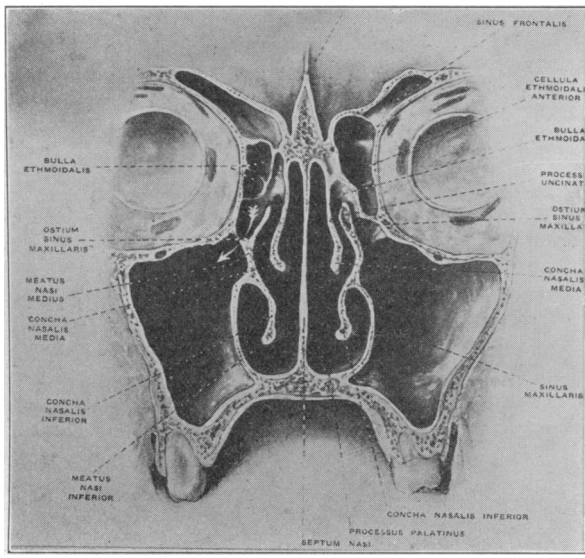

Figure 1 shows the teeth in place; the relation of the alveolar process to the Antrum of Highmore.

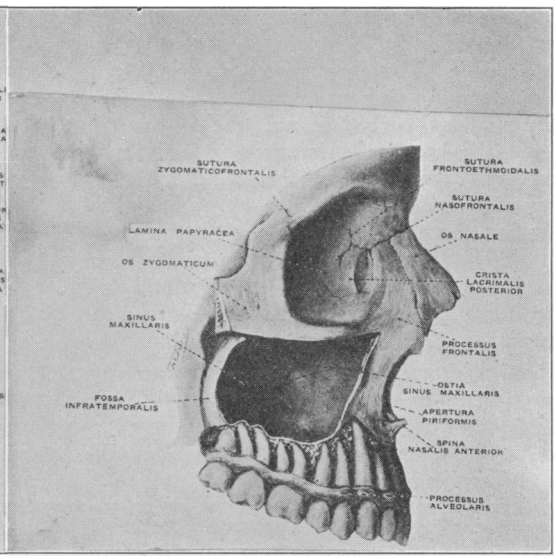

Figure 2 shows the depth of the alveolar process and the relation of the teeth.

or that the infecting micro-organism is so virulent that they will not yield to the minor procedures.

Jansen of Berlin says that an influenza infection of the Antrum of Highmore always requires the radical operation. I am not thoroughly in accord with his teachings, as the known cases of influenza infections are not of sufficient number to warrant positive statements.

The x-ray is of little or no benefit in determining the kind of operative procedure necessary.

Did it ever occur to you that in an acute corrhyza the whole mucous membrane of the nose and that of all the accessory sinuses participate? The blood supply is the same. The mucous membrane has not quite so many cilia and there are not so many glands to secrete mucus. Otherwise they are the same. Now, with this in mind, there are many cases that recover entirely if left alone; left to nature to overcome the infection. The cases that do not, have a malformation such as a deviated septum or some hypertrophied turbinates. We rarely see a nose that is perfect anatomically with an acute infection of the Antrum of Highmore. In other words, the malformation and the hypertrophied tissue predispose to such an infection. Often an acute infection will recover if the secretion has sufficient room to discharge. This is decided for or against by the amount of discomfort (pain or headache). Sometimes it is necessary to do a septum operation. Sometimes the removal of the anterior end of the middle turbinate is sufficient. The removal of an hypertrophied anterior end of the middle turbinate is always essential.

For diagnosis as well as for purposes of treatment, a probe puncture of the Antrum of Highmore will give definite information as to the kind of infection, the character of the infection, and sometimes will tell you that you are dealing with an acute exacerbation of a chronic suppuration (by the appearance of cheesey pus). This simple procedure is to be repeated daily or every other day, dependent upon the character of the discharge, the time between treatments to be increased as the infection subsides.

It is usually quite easy to find the opening of the puncture needle after it is once established. (Some prefer a larger opening, the size about the circumference of an ordinary lead pencil.) I only mention this to say that it is unnecessary. At times a canula can be introduced into the normal opening and the cavity cleaned in that way.

In the event that the middle turbinate has been removed in part or whole, an opening can be made more easily at this place than anywhere else, and it will remain patent and the infection handled in this way.

Any opening that is made in the interior meatus will not drain the Antrum of Highmore because there will remain a partition a half inch (more or less) that separates the nose from the antrum. Because of this, the other procedures are better, as they do not impair the nose in any particular. With one or the other of these operations, you must bring your case to a successful issue or do more radical work. In all my practice, this has only been necessary a few times. (They may have been influenza infections.)

Acute infection following the extraction of a tooth. This is entirely different from the other forms because we start with a perfectly healthy Antrum of Highmore, and if given any kind of a chance will recover in a short time. The infection is based upon traumatism plus lack of surgical cleanliness.

The treatment for this is to wash the antrum through the fistula daily until the discharge begins to subside and then wash every other day, every third day, and so on. The fistulous tract must be tamponed after each irrigation and this tampon must be sufficiently tight so that water or air will not enter, and must be of a single piece of gauze. When the discharge subsides, the packing is removed every three or four days, with less and less gauze used, until the fistula closes completely.

1. From a previous Antrum of Highmore operation. This must be closed by plastic surgery. Tak-

ing a piece of mucous membrane and periosteum from one side of the fistula, freshening the edge of the opposite side, elevating and bringing together without tension and suturing.

2. Fistula brought about by the extraction of a tooth. The smaller ones are brought to a successful issue by curetting very thoroughly because often there is a loose piece of bone. Tamponing and cleansing from day to day and usually the fistula will heal. If you fail to bring this to a successful issue, a radical operation is necessary, and at the time of the radical operation the fistula can be taken care of.

Fistula into the Antrum of Highmore, with such a large opening that it is impossible to close by the foregoing procedures, will be brought to complete healing by an operation that I have devised, and I can assure you is perfectly satisfactory.

Under general anesthesia, an incision was made at each end of the fistula on the outer side of the alveoli and carried well up to where the bone had been removed in the Antrum of Highmore operation. Periosteum and mucous membrane were removed from the alveolus, and afterward the whole of the outer border of the alveolus, into the Antrum of Highmore. A similar incision was made on the inside at each end of the fistula, periosteum and mucous membrane elevated from the bone and the bone removed. By this time I had an opening an inch and a half long, into which I could easily put my finger and enter the Antrum of Highmore.

An incision was now made in the median line of the hard palate its entire length, and the periosteum elevated over the entire area. It is easy to understand that by this procedure all tension will be removed when the sutures are introduced. So that the sutures may not cut the tissue, two perforated lead discs are used on each side and the sutures tied rather snugly. These sutures can remain for ten days, when it will be found that the union has been complete and the patient will be very well satisfied.

Chronic infection of the Antrum of Highmore, diagnosed by accompanying nasal pathology, malformation, by the duration of the discharge, by the character of the discharge and by the symptoms produced. I proceed in one way—by the radical operation or the Luc-Caldwell operation with the Welty modification.

This operative procedure has been so universally satisfactory for me that no one could induce me to do a different operation. For probably twelve or fifteen years I have been doing it in the same way, the same procedure in detail, and I can assure you that I have not had to reoperate a single case. Besides, every case is well; absolutely dry as far as I am aware. With such a record for an operative procedure it stands in your own mind pre-eminent. I want you to know about it. I want you to do it in the way I have done it, and I know you will have the same result. However, I must insist that you do not make any modifications until you have learned well to do in detail what I describe.

The incision, about two inches long, is made over the canine fossa, about half an inch above the margin of the mucous membrane and the teeth.

The opening into the Antrum of Highmore is made with a round chisel and enlarged with the Hajak antrum gouge until every vestige of overhanging boney wall has been taken away. Afterward the edges are made smooth by a hand burr or one driven by electricity.

The polypoid membrane is now curetted from the cavity of the Antrum of Highmore, every vestige of it. Sometimes it is particularly difficult to remove the mucous membrane that dips into the normal or abnormal openings into the nose. After the cavity is dry and every part of the mucous membrane removed, you introduce the round chisel into the nose and to the lateral side, enter the Antrum of Highmore. After it is once entered, a heavy curet can be used to break down the whole of the lateral wall of the nose below the inferior turbinate. This will extend to the far end of the Antrum of Highmore. Now, with a sharp curet, cut down the remaining edge of the lateral wall of the nose until the floor of the nose and the cavity of the Antrum of Highmore are on the same plane. Sometimes it is not possible for them to be on the same plane. However,

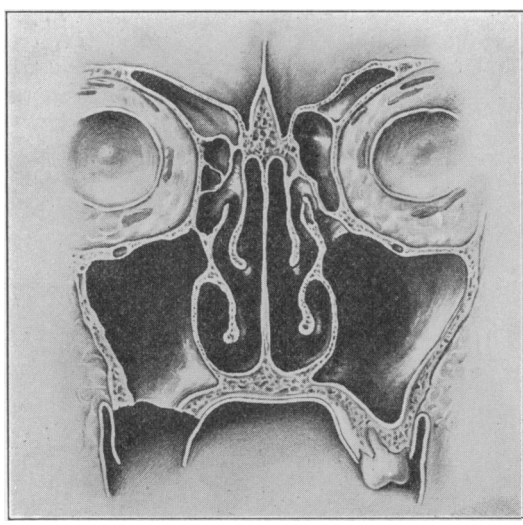

Figure 3 shows the alveolar process on either side removed. The mucous membrane and periosteum lying loose.

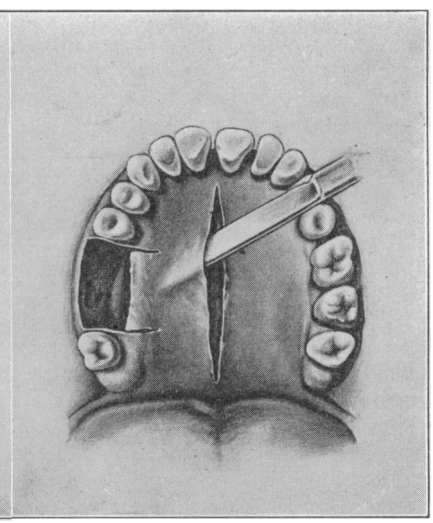

Figure 4—The incision and elevation of the periosteum and hard palate, and the incision from either side of the fistula.

the lateral wall of the nose must have been so completely removed that it cannot be found with a hooked probe. Now you can take a curved scissors and mouse-toothed forceps and cut the mucous membrane and bone away until you encounter the attachment of the inferior turbinate. This is cut away for the entire length of the lateral wall of the nose. All edges and rough places to be cut away or removed with a burr.

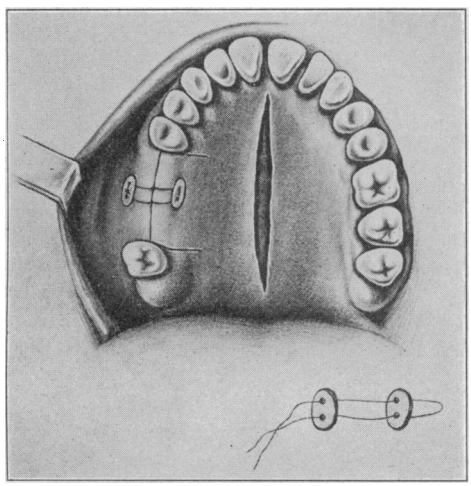

Figure 5

Now we are ready to close our original incision with interrupted sutures of black silk, a small tampon left in the Antrum of Highmore while closing. Before tying the individual sutures, they should be made secure by fastening with artery forceps. It usually requires from five to six sutures. Before tying sutures, remove the tampon. These sutures are removed in from six to eight days. Tampon about six inches long and two inches wide is introduced into the antrum by way of the nose. This is removed the following morning. This small tampon is put into the nose for the purpose of forming a clot and not to control hemorrhage.

After the fourth day the Antrum of Highmore is irrigated with normal salt solution daily until the water returns free from secretion and shreds. The interval of these irrigations is increased with the progress of recovery.

I have saved what I consider the best of the technique for the last, and that is my modification of the Luc-Caldwell operation. This consists of not touching the inferior turbinate surgically.

You can examine any of my patients, and you could not say from the appearance of the inside of the nose that it had ever been touched by an operative procedure.

The integrity of the nose is as good as it ever was, and they never have a relapse.

210 Post Street.

DISCUSSION

E. F. Tholen, M. D. (1136 West Sixth Street, Los Angeles)—Dr. Welty brought out some excellent points in his paper. I wish to discuss it only from the dental side. I have seen many cases of antral disease in which the sole etiological factor was an abscessed tooth or a pyorrhea pocket extending into the antrum. Removal of the diseased teeth and curetting of the socket with a few irrigations of the antrum brought about a cure. If a chronic antrum persists after good drainage is established, the devitalized teeth on that side of the jaw should be removed before resorting to a radical operation. I rarely pack an antral fistula more than a few days. If the opening is large I have a removable dental shield made to fit over the opening and attached to the teeth. This prevents solid food particles from going into the antrum.

I practice the principles devised by Dr. Welty for closure of antral fistulae, but do not find it necessary to remove as much alveolar process or to make the mesial incision more than one-half way to the mid line.

Kaspar Pischel, M. D. (Butler Building, San Francisco)—Regarding the value of roentgen pictures, I have learned from experience that the negative findings are more reliable than the positive ones. An antrum once affected seems to show a shadow in the roentgen picture, even if it is entirely healed; apparently the walls become thickened by the inflammation.

When making a probe puncture for diagnostic purposes, I first aspirate, to assure myself that the needle is in the antrum, because fatalities have been reported from blowing air into veins. If I intend to wash out the antrum several times, I prefer to use a large trocar, because then I can find the opening so much easier and with less traumatism.

Frank Albert Burton, M. D. (Watts Building, San Diego)—A busy ear, nose and throat man sees a large number of cases with maxillary involvement and it is always valuable to have the benefit of the experience of other rhinologists. After all, experience is the best teacher and since Dr. Welty has used the method that he refers to for a period of fifteen or twenty years, it is valuable to us to have the benefit of his large experience.

In his method, Dr. Welty provides free drainage and good ventilation, which we all recognize as classic objectives in dealing with the sinuses. It was brought out in the paper that there are often intranasal abnormalities and pathology requiring attention to provide good drainage and ventilation. As it not infrequently occurs that making a large naso-antral opening and irrigation fails to get the desired results where there is a deviated septum hypertrophied or degenerated turbinates.

In my work I have always considered the matter of diagnosis the most important step, and have learned to depend largely upon careful history taking and clinical findings. Trans-illumination and x-ray used only incidentally. It is my conclusion that from time to time a case presents with a diseased maxillary sinus, the diagnosis of which can only be made by exclusion. For such cases the puncture method recommended by Mullin and Dennis is very helpful.

One of our colleagues is working upon an instrument with which he soon expects to make quick illumination possible via puncture canula passing through naso-antral wall. Such a method is surely feasible and doubtless will soon be available for us all.

In sinus surgery, as well as all other surgery, the conservation of functioning structures should not be lost sight of and with this in mind in all my sinus surgery I have studiously avoided destruction of healthy turbinate tissue. I have been able to get satisfactory results by fracturing the inferior turbinate and lifting it high up in the nose (avoiding traumatism to soft tissue), removing the naso-antral wall as completely as possible, taking special care to come well forward and to provide the least amount of "bridge" between floor of nose and floor of antrum. Immediately following the operation, I dry and thoroughly inspect the cavity with the naso-pharyngoscope.

By rhinologists it is generally conceded that empyema of the maxillary sinus is frequently overlooked. This is probably even more true in children than in adults. In the surgery of the maxillary sinus of the child, the difference in its size and location must be taken into account.

In connection with infection associated with tooth extraction, the better dentists are refraining as far as

possible from probing through the tooth socket into the antrum.

Dr. Welty (closing)—In reply to Dr. Tholen I must say that it is absolutely important that the fistulous opening be kept closed as long as air or liquids can be forced through. Otherwise the patients will not all recover.

As I said in my paper, acute infection of the Antrum of Highmore by way of tooth extraction can be treated very satisfactorily by keeping the fistula open as long as there is pus in the antrum and then allow it to close. The protector is a very excellent device, and I have frequently used it. If patients do not recover, they have to have the radical operation.

In reply to Dr. Pischel in regard to x-ray examinations of the Antrum of Highmore, will go a little more into detail because the x-ray is not at all reliable.

1. An infected antrum will frequently give a negative finding.
2. An antrum that has once been infected will frequently give a positive finding after the case is entirely well.
3. An Antrum of Highmore that has once been operated will always give a positive finding, when cured or otherwise.
4. The puncture needle, with irrigation, is the only reliable way to know the condition of the Antrum of Highmore.

In regard to sudden death following the introduction of the needle into the Antrum of Highmore, I am not so certain as to what causes the death. In one instance that I know of, such a death was caused by a cerebral hemorrhage. There was an autopsy.

Another case that I know of occurred as the needle was introduced into the Antrum of Highmore. Everything was negative at this autopsy finding. Probably due to cocainism. My reasons for saying so are based on the fact that a pledget of cotton saturated with a 20 per cent solution of cocain should never be left in the nose for any purpose whatsoever. The only safe way is to wrap a small piece of cotton tightly on an applicator, dipped in a 20 per cent solution of cocaine; excess pressed out. Rub this particular surface for two or three minutes. Three different rubbings or less will suffice. There will not be any pain, nor will there be a chance for cocainism.

This has been my practice for a long time, and I never have seen cocainism. By the way, hysteria and faintness are often mistaken for cocainism. This is largely overcome by operations in the recumbent position.

In reply to Dr. Burton: It is absolutely necessary in all cases to correct any malformation such as a deviated septum. Because the contact of a deviated septum will produce a mucous secretion that will leave your patient not entirely well, and if this is continued will more than likely upset all your operative procedures. The same holds true for hypertrophies. In regard to polypi, they may have been produced by the drainage from the Antrum of Highmore, and again they may be from infection above. They must be removed and this region made clean, or again your operation will fail, or the patient will continue to have pus in his nose and to the patient his operation has not been successful because he continues to have pus.

The modification of this operation consisted in leaving the whole of the inferior turbinate in place. I have tried the fracture, but I have discontinued it because, in the first place, it is not necessary, and second, it does not always remain just where you would like to have it.

At the present day it is indeed bad surgery to remove any healthy tissue from the nose that has anything to do with the functioning of nasal respiration. That was my reason for leaving the whole of the inferior turbinate. In addition, it frequently happened that there was a watery discharge from the cut end of the turbinate that was very difficult of correction and sometimes could not be corrected.

In conclusion, I will say that if you are interested in this monograph of mine, read the whole paper more carefully than you did before. Pay particular attention to what I have said and the way I have said it, for I believe in every statement that I have made. I do believe in it in such a way and to such a degree that I wish to inspire you with confidence; after practicing this for some time, you will be as enthusiastic as I am.

EPITHELIOMA OF THE LIP TREATED WITH RADIUM*

By DOUGLASS W. MONTGOMERY, M. D., San Francisco, and GEORGE D. CULVER, M. D., San Francisco

It is our belief that a malignant growth of the lip that can be successfully treated by any of the known methods can be more surely eradicated by the use of radium, either alone or in combination with whatever other means may be indicated, and the perfection of the cosmetic functional result cannot by other methods be equaled.

DISCUSSION *by L. R. Taussig, San Francisco; James F. Percy, Los Angeles; Kendal P. Frost, Los Angeles; Moses Scholtz, Los Angeles; George D. Culver, San Francisco.*

We have treated in all sixty-nine cases of cancer of the lip with radium, of which sixty-seven were of the lower lip and two of the upper. There were sixty-six males and three females. One male and one female had cancer of the upper lip. The average age of all the patients was 51 years.

It has been possible to gain information, in a follow-up of sixty of the patients treated during 1917 and up to the present time. Forty-eight are still alive and apparently cured. It has not been possible to trace nine of the patients, several of whom it is reasonable to believe are deceased. Six of those traced are known to be deceased, and only two died from the effects of the cancerous process. One of these two was hopeless from the first, and the other, a man 84 years old, developed metastases and died. Another, a man over 80 years old and extremely feeble, already had metastases, but his lip healed perfectly and his death resulted from myocarditis. Still another, with a probable involvement of the lymphatics, was freed of his lip lesion and rendered more easily operable. This patient disappeared. An instance of probable failure was the case of one of the females, whose lip was not well when she disappeared. One case, still under observation by letter, is doubtful as to a complete cure. Three patients, recently treated, are under observation and doing well, but the time is too short to say if they are probably cured. At most, we can account for only six failures. One of these may not be a failure, as we have not yet seen the patient. This gives less than 9 per cent of failures in a group of cases disadvantageously selected, as many of the patients are sent to us as being inoperable, either from the advanced state of the growth or because of the physical condition.

THE ADVANTAGES OF RADIUM TREATMENT

When we first began the use of radium we feared to trust to it entirely, and we employed the curet and the high-frequency current pretty liberally, but we afterward found that this was usually unnecessary, and that it decidedly interfered with the perfection of the result.

In one respect the lip is particularly favorable for the employment of radium, as it is a flap organ and

* Presented to the Section on Dermatology at the Fifty-third Annual Session of the California Medical Association, Los Angeles, May, 1924.